

What Is Claimed Is:

1. A method for forming a seamless cladding panel comprising:
 - providing a mold having a mold surface;
 - providing a coating layer onto said mold surface to a first desired dry thickness;
 - introducing a first laminate layer onto said coating layer at a first desired thickness;
 - introducing a core material onto said first laminate layer, said core material comprising a plurality of fibers;
 - introducing a second laminate layer onto said core material at a second desired thickness, said first laminate layer and said second laminate layer each comprising a resin and a fiber material;
 - optionally introducing a light facing veil onto said second laminate layer, said light facing veil comprising a fibrous strand and a binder system, wherein a portion of said resin of said second laminate layer substantially wets out said fibrous strand; and
 - curing a resin of said first laminate layer and said second laminate layer.
2. A method for forming a seamless cladding panel according to claim 1, wherein said coating layer comprises a wet layer of gel coating.
3. A method for forming a seamless cladding panel according to claim 2, wherein said gel coating is substantially cured before introducing said laminate layer.

4. A method for forming a seamless cladding panel according to claim 3, wherein said core material comprises a plurality of glass fibers bound together with a binder resin.

5. A method for forming a seamless cladding panel according to claim 4, wherein said first laminate layer and said second laminate layer each comprises an ambiently curable resin and a chopped fiber material.

6. The method of claim 2, wherein said gel coating comprises an ambiently curable polyester-based resin.

7. The method of claim 1, wherein said coating layer comprises a dry film material

8. The method of claim 3, wherein said substantially curing said gel coating layer comprises ambiently curing said gel coating layer at 80 degrees Fahrenheit for about forty five minutes.

9. The method of claim 3, wherein substantially curing said gel coating layer comprises oven curing said gel coating layer.

10. The method of claim 1 further comprising removing trapped air within said first laminate layer prior to introducing said core material.

11. The method of claim 1, wherein said first laminate layer has a wet thickness between approximately 0.45 and 0.50 inches.

12. The method of claim 5, wherein the fiber material comprises between approximately 23 and 25 weight percent of said first laminate layer prior to curing said curable resin.

13. The method of claim 12, wherein said fiber material comprises between approximately 23 and 25 weight percent of said second laminate layer prior to curing said ambiently curable resin.

14. The method of claim 13, wherein said fiber material in said first laminate layer is selected from the group consisting of chopped roving strands, chopped continuous filament strands, chopped glass strands, chopped glass strand matting, and combinations thereof.

15. The method of claim 14, wherein said fiber material comprises a chopped fiber material having a length of approximately one inch.

16. The method of claim 5, wherein said ambiently curable resin comprises an ambiently curable modified polyester resin.

17. The method of claim 16, wherein said ambiently curable modified polyester resin comprises between 98 and 99 weight percent of an ambiently curable modified polyester resin and between 1 and 2 weight percent of a methyl ethyl ketone peroxide curing agent.

18. The method of claim 1, wherein said first laminate layer comprises a plurality of first laminate layers.

19. The method of claim 1, wherein said second laminate layer comprises a plurality of second laminate layers.

20. The method of claim 4, wherein said core material comprises a plurality of glass fibers having an average nominal length of about 0.625 inches.

21. The method of claim 20, wherein said plurality of glass fibers comprising said core material have an average diameter of about 13 micrometers.

22. The method of claim 21, wherein said binder material comprising said core material is selected from the group consisting of a modified polyvinylacrylate binder material and an acrylic binder material.

23. The method of claim 1, wherein said light facing veil comprises chopped fiber strand having an average diameter of about 11 to 13 microns.

24. The method of claim 23, wherein said binder system of said light facing veil is selected from the group consisting of an acrylic binder system, a polyvinyl alcohol binder system, and a urea/formaldehyde binder system.

25. The method of claim 1, wherein the steps of introducing said laminate layers comprises the steps of providing fibrous reinforcement on each side of the core material, and subsequently vacuum infusing a resin to wet out the fibrous reinforcement.

26. The method of claim 25, wherein the step of providing said laminate layers comprises placing a first glass fiber mat on said coating layer and a second glass fiber mat on said core material.

27. A seamless composite backer-less cladding panel comprising:

a coating layer;

a first laminate layer laid onto said coating layer;

a core material laid onto said first laminate layer, said core material comprising a plurality of fibers bound together;

a second laminate layer laid onto said core material, wherein said first laminate layer and said second laminate layer each comprises a curable resin and a fiber material; and

an optional light facing veil laid on said second laminate layer, said light facing veil comprising a fiber strand and a binder system, wherein a portion of said curable resin of said second laminate layer substantially wets out said chopped fiber strand.

28. The seamless cladding panel of claim 27, wherein said coating comprises a cured polyester-based resin.

29. The seamless cladding panel of claim 27, wherein said coating has a dry thickness of between about 0.14 and 0.16 inches.

30. The seamless cladding panel of claim 27, wherein said first laminate layer and said second laminate layer are substantially air free.

31. The seamless cladding panel of claim 27, wherein said first laminate layer has a wet thickness between approximately 0.45 and 0.50 inches.

32. The seamless cladding panel of claim 27, wherein said fiber material comprises between approximately 23 and 25 weight percent of said first laminate layer prior to curing a resin of said laminate layer.

33. The seamless cladding panel of claim 27, wherein said fibers comprises between approximately 23 and 25 weight percent of said second laminate layer prior to curing a resin of said second laminate layer.

34. The seamless cladding panel of claim 27, wherein said fiber material in said first laminate layer is selected from the group consisting of chopped roving strands, chopped continuous filament strands, chopped glass strands, chopped glass strand matting, and combinations thereof.

35. The seamless cladding panel of claim 27, wherein said laminate layers comprise an ambiently curable modified polyester resin.

36. The seamless cladding panel of claim 35, wherein said curable modified polyester resin further comprises a methyl ethyl ketone peroxide curing agent.

37. The seamless cladding panel of claim 36, wherein said methyl ethyl ketone peroxide curing agent comprises between 1 and 2 weight percent of said resin.

38. The seamless cladding panel of claim 27, wherein said first laminate layer comprises a plurality of laminate layers.

39. The seamless cladding panel of claim 27, wherein said second laminate layer comprises a plurality of laminate layers.

40. The seamless cladding panel of claim 27, wherein said fibers of said core material comprise glass fibers having an average nominal length of about 0.625 inches.

41. The seamless cladding panel of claim 40, wherein said fibers of said core material have an average diameter of about 13 micrometers.

42. The seamless cladding panel of claim 27, wherein said core material comprises a binder material selected from the group consisting of a modified polyvinylacrylate binder material and an acrylic binder material.

43. The seamless cladding panel of claim 27, wherein said light facing veil comprises chopped fiber strand having an average diameter of about 11 to 13 microns.

44. The seamless cladding panel of claim 27, wherein said light facing veil comprises a binder selected from the group consisting of an

acrylic binder system, a polyvinyl alcohol binder system, and a urea/formaldehyde binder system.

45. The seamless cladding panel of claim 27 manufactured using a vacuum infusion process.

46. A seamless composite backer-less cladding panel comprising:

a coating layer;

a first laminate layer laid onto said coating layer;

a core material laid onto said first laminate layer, said core material comprising a plurality of fibers bound together;

a second laminate layer laid onto said core material said first laminate layer and said second laminate layer each comprising a resin and a plurality of chopped fiber material; and

an optional light facing veil laid onto said second laminate layer, said light facing veil comprising a chopped fiber strand and a binder system, wherein a portion of said ambiently curable resin of said second laminate layer substantially wets out said chopped fiber strand.

47. A seamless composite backer-less cladding panel according to claim 46, wherein said resin of said laminate layers is provided through vacuum infusion.

48. A method for forming a seamless cladding panel comprising:

providing a mold having a mold surface, said mold surface having an outer portion, said outer portion having a first side and a

second side, said first side having an injection port and said second side of said mold surface having at least one vacuum port;

providing a layer of coating to said mold surface in a substantially dry form;

introducing a layer of plies onto said coating layer, said layer of dry plies comprising a first fiber layer, a core material layer, an optional flow medium layer, a second fiber layer, and an optional veil layer;

introducing an injection netting within said mold to cover said injection port, said injection netting located between said injection port and said wet layer;

introducing a vacuum netting with said mold to cover said at least one vacuum port, said vacuum netting located between said at least one vacuum port and said wet layer;

coupling a vacuum bag onto said layer of dry plies within said mold,

sealing coupling said vacuum bag to said outer portion, therein forming a chamber defined within said mold between said outer portion, said vacuum bag, and said mold surface;

coupling a vacuum source to said at least one vacuum port;

introducing a vacuum pressure through said vacuum port;

introducing an ambiently curable binder resin through said injection port to infuse said layer of dry plies; wherein said vacuum pressure seals said vacuum bag to said layer of dry plies such that said vacuum bag compresses said layer of dry plies to a desired thickness;

removing said vacuum pressure;

closing said injection port;

curing said ambiently curable binder resin to form the seamless cladding panel within said mold; and

removing the seamless cladding panel from said mold.

49. The method of claim 48, wherein said coating comprises an ambiently curable polyester-based resin applied to said mold surface and substantially cured thereon prior to introducing said plies.

50. The method of claim 49, wherein said coating has a dry thickness is between about 0.18 and 0.20 inches.

51. The method of claim 50, wherein substantially curing said gel coating layer comprises ambiently curing said gel coating layer at ambient temperature for about forty five minutes.

52. The method of claim 50, wherein substantially curing said gel coating layer comprises ambiently curing said gel coating layer at ambient temperature for about sixty minutes.

53. The method of claim 48, wherein said first fiber layer comprises chopped fibers having an average length of between about 1 and 2 inches.

54. The method of claim 49, wherein said first fiber layer comprises gun roving chopped glass having an average length of about 2 inches.

55. The method of claim 48, wherein said first fiber layer comprises chopped polymer fibers.

56. The method of claim 48, wherein said first fiber layer comprises chopped glass fibers.

57. The method of claim 48, wherein said core material layer comprises a core glass fiber bound with a binder resin.

58. The method of claim 57, wherein the core glass fiber has a nominal length of about .625 inches and a diameter of about 13 micrometers.

59. The method of claim 57, wherein said core material layer comprises a plurality of core material layers.

60. The method of claim 57, wherein said core material comprises a binder resin selected from the group consisting of an acrylic binder resin and a modified polyvinylacrylate binder resin.

61. The method of claim 48, wherein said optional flow medium layer comprises a three-dimensional woven fabric layer.

62. The method of claim 61 wherein said three-dimensional woven fabric layer comprises a three-dimensional woven glass fiber fabric layer.

63. The method of claim 61, wherein said three-dimensional woven fabric layer comprises a three-dimensional woven polyester fiber fabric layer.

64. The method of claim 48, wherein said veil layer comprises a chopped fiber strand and a binder system.

65. The method of claim 64, wherein said chopped fiber strand of said light facing veil has an average diameter of about 11 to 13 microns.

66. The method of claim 64, wherein said binder system of said light facing veil is selected from the group consisting of an acrylic binder system, a polyvinyl alcohol binder system, and a urea/formaldehyde binder system

67. The method of claim 48, wherein said ambiently curable binder resin is injected at a viscosity not to exceed about 175 centipoise.

68. The method of claim 48, wherein said ambiently curable binder resin comprises a polyester modified ambiently curable binder resin.

69. The method of claim 48, wherein said vacuum pressure is maintained between about 25 and 35 inches of mercury pressure as said ambiently curable binder resin is being injected.

70. The method of claim 48, wherein said vacuum pressure is maintained between about 29 and 33 inches of mercury pressure as said ambiently curable binder resin is being injected.

71. The method of claim 48, wherein curing said ambiently curable binder resin comprises maintaining said mold at ambient temperatures for about 45 to 60 minutes.

72. A seamless cladding panel made in accordance with the method of claim 1.

73. A seamless cladding panel made in accordance with the method of claim 48.

74. A seamless cladding panel comprising:
a coating layer; and
a resin infused and compressed plies layer, said layer of plies comprising a first fiber layer, a core material layer, an optional flow medium layer, a second fiber layer, and an optional veil layer, said layers optionally being stitched together with a stitching material.

75. The seamless cladding panel of claim 74, wherein said coating comprises an ambiently curable polyester-based resin gel coat.

76. The seamless cladding panel of claim 74, wherein said first fiber layer comprises chopped fibers having an average length of between about 1 and 2 inches.

77. The seamless cladding panel of claim 74, wherein said first fiber layer comprises one of the group consisting of chopped glass fibers and chopped polymer fibers.

78. The seamless cladding panel of claim 76, wherein said first fiber layer comprises gun roving chopped glass having an average length of about 2 inches

79. The seamless cladding panel of claim 74, wherein said core material layer comprises a core glass fiber bound with a binder resin.

80. The seamless cladding panel of claim 79, wherein core glass fiber has a nominal length of about .625 inches and a diameter of about 13 micrometers.

81. The seamless cladding panel of claim 79, wherein said core material layer comprises a plurality of core material layers.

82. The seamless cladding panel of claim 79, wherein said binder resin is selected from the group consisting of an acrylic binder resin and a modified polyvinylacrylate binder resin.

83. The seamless cladding panel of claim 74, wherein said optional flow medium layer comprises a three-dimensional woven fabric layer.

84. The seamless cladding panel of claim 83, wherein said three-dimensional woven fabric layer comprises a three-dimensional woven glass fiber fabric layer.

85. The seamless cladding panel of claim 83, wherein said three-dimensional woven fabric layer comprises a three-dimensional woven polyester fiber fabric layer.

86. The seamless cladding panel of claim 74, wherein said veil layer comprises a chopped fiber strand and a binder system.

87. The seamless cladding panel of claim 86, wherein said chopped fiber strand of said light facing veil has an average diameter of about 11 to 13 microns.

88. The seamless cladding panel of claim 87, wherein said binder system of said light facing veil is selected from the group consisting of an acrylic binder system, a polyvinyl alcohol binder system, and a urea/formaldehyde binder system

89. The seamless cladding panel of claim 74, wherein said ambiently curable binder resin comprises a polyester modified ambiently curable binder resin.

90. A method for forming a seamless cladding panel comprising:

providing a mold having a mold surface, said mold surface having an outer portion, said outer portion having a first side and a second side, said first side having an injection port and said second side of said mold surface having at least one vacuum port;

providing a layer of coating to said mold surface in a substantially dry form;

introducing a layer of plies onto said coating layer, said layer of dry plies comprising a first fiber layer, a core material layer, an optional flow medium layer, a second fiber layer, and an optional veil layer;

coupling a vacuum bag onto said layer of dry plies within said mold, said bag defining a plurality of resin flow channels,

sealing coupling said vacuum bag to said outer portion, therein forming a chamber defined within said mold between said outer portion, said vacuum bag, and said mold surface;

coupling a vacuum source to said at least one vacuum port;
introducing a vacuum pressure through said vacuum port;
introducing an curable binder resin through said injection port to
infuse said layer of dry plies; wherein said vacuum pressure seals said
vacuum bag to said layer of dry plies such that said vacuum bag
compresses said layer of dry plies to a desired thickness;
removing said vacuum pressure;
closing said injection port;
curing said curable binder resin to form the seamless cladding
panel within said mold; and
removing the seamless cladding panel from said mold.